

We claim:

1. An apparatus for depositing functional blocks into a substrate comprising:
 - a relocating tool having a first plurality of receptor sites having a plurality of functional blocks deposited therein; and
 - a transfer tool having a plurality of nozzles which are in alignment with said first plurality of receptor sites, said transfer tool being able to remove said plurality of functional blocks from said relocating tool and deposit said plurality of functional blocks into a second plurality of receptor sites in said substrate.
2. An apparatus for depositing functional blocks into a substrate as in claim 1 further comprising a vibration device coupling to said transfer tool to agitate said transfer tool as said plurality of functional blocks are being deposited into said second plurality of receptor sites.
3. An apparatus for depositing functional blocks into a substrate as in claim 1 further comprising an adhesive dispensing device to dispense adhesive into said second plurality of receptor sites in said substrate before said plurality of functional blocks are deposited into said second plurality of receptor sites.
4. An apparatus for depositing functional blocks into a substrate as in claim 1 further comprising a micro liquid dispensing device to dispense droplets of fluid over said second plurality of receptor sites before said plurality of functional blocks are deposited into said second plurality of receptor sites.

5. An apparatus for depositing functional blocks into a substrate as in claim 1 further comprising an adhesive dispensing device and a micro liquid dispensing device, said adhesive device to dispense adhesive into said second plurality of receptor sites in said substrate and said micro liquid dispensing device to dispense droplets of fluid over said second plurality of receptor sites before said plurality of functional blocks are deposited into said second plurality of receptor sites.
6. An apparatus for depositing functional blocks into a substrate as in claim 1 wherein said second plurality of receptor sites being configured to mate with said plurality of functional blocks.
7. An apparatus for depositing functional blocks into a substrate as in claim 6 wherein said plurality of receptor sites and said plurality of functional blocks have any one of a trapezoidal shape, a rectangular shape, a square shape, and a cylindrical shape
8. An apparatus for depositing functional blocks into a substrate as in claim 6 wherein said plurality of functional blocks has an asymmetrical shape and said plurality of receptor sites are configured to match said asymmetrical shape.
9. An apparatus for depositing functional blocks into a substrate as in claim 1 wherein said transfer tool is further coupled to a vacuum source conveying vacuum to said plurality of nozzles.

10. An apparatus for depositing functional blocks into a substrate as in claim 1 wherein all of said first plurality of receptor sites have same dimensions and shapes.
11. An apparatus for depositing functional blocks into a substrate as in claim 1 wherein said first plurality of receptor sites comprises of different size and shape receptor sites.
12. An apparatus for depositing functional blocks into a substrate as in claim 1 wherein said plurality of nozzles has a dimension that is smaller than a dimension of said plurality of functional blocks.
13. An apparatus for depositing functional blocks into a substrate as in claim 1 wherein said plurality of functional blocks are deposited in said transfer tool by an FSA device using a slurry to deposit said plurality of functional blocks into said relocating tool.
14. An apparatus for depositing functional blocks into a substrate as in claim 13 further comprising a drying device.
15. An apparatus for depositing functional blocks into a substrate as in claim 13 further comprising a curing device.
16. An apparatus for depositing functional blocks into a substrate comprising:
 - a relocating tool having a first plurality of receptor sites having a plurality of functional blocks deposited therein, said plurality of functional blocks further comprises circuitry components;

a transfer tool having a plurality of nozzles, said transfer tool being able to remove said plurality of functional blocks from said relocating tool and deposit said plurality of functional blocks into said substrate wherein said substrate is made out of a thermoset material and wherein said substrate is hot wherein said plurality of functional blocks are being deposited.

17. An apparatus for depositing functional blocks into a substrate as in claim 16 further comprising a heating device capable of heating said substrate to above a softening point.

18. An apparatus for depositing functional blocks into a substrate as in claim 17 further comprising a curing device to cure said substrate.

19. An apparatus for transferring functional blocks comprising:

a transfer tool having a plurality of nozzles, said transfer tool to remove a plurality of functional blocks formed on a first substrate from said first substrate;

a transfer station to invert said plurality of functional blocks; and

wherein said transfer tool to pick up inverted functional blocks and deposit said inverted functional blocks onto a second substrate having a plurality of receptor sites.

20. An apparatus for transferring functional blocks as in claim 19 further comprising another transfer tool having another plurality of nozzles wherein said another transfer tool to pick up said inverted functional blocks and deposit said inverted functional blocks onto said second substrate having said plurality of receptor sites.

21. An apparatus for transferring functional blocks as in claim 19 wherein said plurality of receptor sites has a matching pattern with said plurality of nozzles on said transfer tool.
22. An apparatus for transferring functional blocks as in claim 20 wherein said plurality of receptor sites has a matching pattern with said another plurality of nozzles on said another transfer tool.
23. An apparatus for transferring functional blocks comprising:
- a transfer tool having a plurality of nozzles, said transfer tool to remove a plurality of functional blocks formed on a first substrate from said first substrate and to transfer said plurality of functional blocks from said first substrate to a functional layer;
 - a substrate forming station to form a second substrate over said plurality of functional blocks transferred to said functional layer.
24. An apparatus for transferring functional blocks as in claim 23 wherein said functional layer is an adhesive anisotropic conducting film that is used to remove said functional blocks from said first substrate.
25. An apparatus for transferring functional blocks as in claim 23 wherein said functional layer is a photopatternable layer deposited on a carrier film, wherein said carrier film is removed from said photopatternable layer after said second substrate is formed over said plurality of functional blocks to expose said photopatternable layer.

26. An apparatus for transferring functional blocks as in claim 25 further comprising contact vias created in said photopatternable layer for electrical interconnections to said plurality of blocks.
27. An apparatus as in claim 26 wherein said functional layer is a photoresist film.
28. An apparatus for transferring functional blocks comprising:
- a relocating tool having a first plurality of receptor sites having a plurality of functional blocks deposited therein; and
 - a transfer tool coupling to an adhesive layer; said transfer tool to transfer said plurality of functional blocks from said relocating tool to a substrate wherein said plurality of functional blocks adhere to said adhesive layer.
29. An apparatus for transferring functional blocks comprising:
- a vacuum source coupling to said transfer tool, said vacuum source adheres said adhesive layer to said transfer tool.
30. A method of depositing functional blocks into a substrate comprising:
- depositing a plurality of functional blocks into a relocating tool having a first plurality of receptor sites that receive said plurality of functional blocks; and
 - coupling a transfer tool to said relocating tool to transfer said plurality of functional blocks from said relocating tool to a substrate, said transfer tool having a plurality of nozzles aligning with said first plurality of receptor sites wherein said plurality of nozzles attach to said plurality of functional blocks.

31. A method of depositing functional blocks into a substrate as in claim 30 further comprising vibrating said transfer tool to facilitate said transfer.
32. A method of depositing functional blocks into a substrate as in claim 30 wherein said substrate comprises a second plurality of receptor sites aligning with said plurality of nozzles and wherein said method further includes depositing one of said plurality of functional blocks into one of said second plurality of receptor sites.
33. A method of depositing functional blocks into a substrate as in claim 30 comprising:
curing said substrate having said plurality of functional blocks deposited therein.
34. A method of depositing functional blocks into a substrate as in claim 30 wherein said curing comprises using a UV lamp to cure said substrate.
35. A method of depositing functional blocks into a substrate as in claim 31 wherein said method further comprises:
applying vacuum to said plurality of nozzles to secure said plurality of functional blocks during said transfer.
36. A method of depositing functional blocks into a substrate as in claim 30 wherein said depositing said plurality of functional blocks into said relocating tool is done with FSA.
37. A method of depositing functional blocks into a substrate as in claim 31 comprising:

depositing adhesives into said second plurality of receptor sites prior to depositing said plurality of functional blocks into said second plurality of receptor sites.

38. A method of depositing functional blocks into a substrate as in claim 36 comprising:

depositing water droplets over each of said second plurality of receptor sites prior to depositing said plurality of functional blocks into said second plurality of receptor sites.

39. A method of depositing functional blocks into a substrate as in claim 37 comprising:

vibrating said plurality of nozzles while depositing said plurality of functional blocks into said second plurality of receptor sites.

40. A method of depositing functional blocks into a substrate as in claim 38 comprising:

submerging said substrate in water such that each of said second plurality of receptor sites is beneath said water while depositing said plurality of functional blocks into said second plurality of receptor sites.

41. A method of depositing functional blocks into a substrate as in claim 38 comprising:

vibrating said plurality of nozzles while depositing said plurality of functional blocks into said second plurality of receptor sites.

42. A method of depositing functional blocks into a substrate as in claim 31 comprising:

depositing water droplets over each of said second plurality of receptor sites prior to depositing said plurality of functional blocks into said second plurality of receptor sites.

43. A method of depositing functional blocks into a substrate as in claim 41 comprising:

vibrating said plurality of nozzles while depositing said plurality of functional blocks into said second plurality of receptor sites.

44. A method of depositing functional blocks into a substrate as in claim 31 comprising:

coating a layer of an adhesive material over said substrate prior to depositing said plurality of functional blocks into said second plurality of receptor sites.

45. A method of depositing functional blocks into a substrate as in claim 43 comprising:

submerging said substrate in water such that each of said second plurality of receptor sites is beneath said water while depositing said plurality of functional blocks into said second plurality of receptor sites.

46. A method of depositing functional blocks into a substrate as in claim 30 wherein said substrate is made out of a thermoplastic or thermoset material and wherein said method further comprising:

heating said substrate to above a softening limit of said material to soften said substrate prior to said transfer.

47. A method of depositing functional blocks into a substrate as in claim 45 wherein said method further comprises using a force to press said plurality of functional blocks into said substrate.

48. A method of depositing functional blocks into a substrate comprising:

forming a plurality of functional blocks on a first substrate, said plurality of functional blocks further comprises circuitry components;

removing said plurality of functional blocks from said first substrate using a transfer tool having a plurality of nozzles;

inverting said plurality of functional blocks; and

transferring said plurality of functional blocks that are inverted to a second substrate.

49. A method of depositing functional blocks into a substrate as in claim 48 wherein said substrate comprises a plurality of receptor sites aligning with said plurality of nozzles and wherein said transferring of said plurality of functional blocks that are inverted includes depositing one of said plurality of functional blocks into one of said second plurality of receptor sites.

50. A method of depositing functional blocks into a substrate as in claim 48 wherein said substrate is made out of a thermoplastic or thermoset material and wherein said method further comprising:

heating said substrate to above a softening limit of said material to soften said substrate prior to said transferring of said plurality of functional blocks into said substrate.

51. A method of depositing functional blocks into a substrate as in claim 48 wherein said inverting said plurality of functional blocks comprises:

picking up said plurality of functional blocks that are inverted using another transfer tool.

52. A method of depositing functional blocks into a substrate comprising:

forming a plurality of functional blocks on a first substrate, said plurality of functional blocks further comprises circuitry components;

removing said plurality of functional blocks from said first substrate using a transfer tool having a plurality of nozzles;

transferring said plurality of functional blocks to a photopatternable layer deposited on a carrier;

forming a second substrate over said plurality of functional blocks deposited on said photopatternable layer; and

removing said carrier to expose said photopatternable layer.

53. A method of depositing functional blocks into a substrate as in claim 52 further comprising creating contact vias in said photopatternable layer for electrical interconnections to said plurality of blocks.